

Single-Puncture Techniques as a Safety Standard in Thread Lifting of the Upper Third of the Face

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Abstract: *The study synthesizes clinical, anatomical, and engineering evidence to argue for single-puncture temporal access as a safety standard in thread lifting of the upper third of the face. The analysis integrates recent procedural reports on eyebrow repositioning, anatomy-guided temporal anchoring, complication reviews, and device disclosures on barbed sutures and cannulae. Attention is directed to the artery-sparing temporal corridor, sub-SMAS vectorization toward the lateral third of the brow, and ultrasound-assisted depth control. The objective centers on consolidating risk while preserving lift magnitude through longer continuous vectors and fascia-based anchoring. Methods include comparative appraisal of peer-reviewed case series, narrative synthesis of complication profiles, and patent-to-practice mapping for barbed constructs and deployment tools published in 2021–2025. Sources comprise ten items across dermatology, aesthetic technology, and patent databases. Conclusions outline a reproducible, instrument-agnostic protocol for single-entry temporal/brow lifts with defined checkpoints for planning, execution, and early troubleshooting, with direct applicability to IP-driven procedural standardization.*

Keywords: thread lifting, single-puncture access, temporal anchoring, eyebrow lift, barbed sutures, ultrasound guidance, sub-SMAS vectors, complication mitigation, patents, upper third of the face.

1. Introduction

Upper-third thread lifting targets lateral brow descent and contour fatigue while avoiding morbidity typical for multipoint intrabrow/forehead entries. Contemporary reports describe consistent tail elevation and arch reshaping when vectors originate from one hair-bearing temporal puncture and traverse sub-SMAS planes toward the lateral brow, with supraperiosteal spread across the forehead. The temporal anchoring zone tracks a vessel- and nerve-sparing lane over deep temporal fascia, lateral to the sentinel vein and clear of the frontal branch of the facial nerve. Materials science developments in braided barbed sutures and deployment cannulae support long, shallow trajectories without external knots, enabling consolidation of access with maintained lift and symmetry. This work assembles a five-year evidence base to formalize single-puncture temporal lifting as a safety-forward protocol for the upper third of the face and to align practical checkpoints with device and patent disclosures.

Aim to formulate a consolidated, evidence-based protocol for single-puncture thread lifting of the upper third of the face.

Tasks:

- 1) Systematize anatomical constraints and vector planning for temporal anchoring and lateral brow rotation.
- 2) Compare safety, durability, and symmetry signals for single-entry temporal access versus multipoint eyebrow/forehead entry.
- 3) Map patent-reported design features and cannula geometries to operative choices that enable one-puncture execution.

Novelty. The study unifies anatomy-guided trajectories, complication governance, and patent-backed device characteristics into a single operational standard with ultrasound checkpoints and reproducibility metrics suitable for clinical adoption and IP translation.

2. Materials and Methods

The study drew on the protected scientific works that document single-puncture temporal thread lifting and a single-point eyebrow-lifting technique—used as source material for defining access geometry, anchor choice, and vector span—specifically the certificates, which were consulted for procedural schematics and claims mapping to clinical checkpoints. In addition, a curated literature set covering 2021–2025 was used to ground the analysis: peer-reviewed clinical reports on eyebrow repositioning and forehead vectorization, anatomy-guided technique papers delineating artery- and nerve-sparing corridors, complication syntheses with mitigation algorithms, and engineering disclosures on barbed suture architectures and thread-delivery cannulae; this corpus provided quantitative signals for safety (vascular/neural avoidance, reduced portal-related trauma), durability determinants (cog geometry, depth control, vector length), and reproducibility (contralateral mirroring from a common lateral anchor, ultrasound depth verification) [1-10].

Methods comprised: structured extraction of anatomic constraints (arterial and neural landmarks) and vector geometry; cross-study tabulation of early adverse events and durability indicators; patent-to-practice mapping of barb architecture, suture construction, and cannula design to single-puncture feasibility; triangulation with ultrasound-assisted planning and troubleshooting procedures.

3. Results

Single-entry temporal thread lifting produced consistent brow elevation with fewer cannula passes and reduced soft-tissue trauma compared with multipoint access. Cadaveric and clinical anatomy syntheses locate a safe temporal anchoring corridor superficial to the deep temporal fascia, lateral to the sentinel vein, and away from the frontal branch of the facial nerve; using a single hair-bearing puncture and sub-SMAS

vectorization reduces contact with the superficial temporal artery and nerve branches [6,9,10].

Standardized vectors from a single entry above the temporal crest delivered measurable lateral brow rotation and lift while minimizing puckering at the dermo-subdermal interface. Clinical series on absorbable barbed threads for eyebrow repositioning reported predictable arch re-shaping and tail elevation when vectors converged on the temporal fixation point rather than multiple eyebrow punctures [5,7].

Anatomy-led placement improved safety margins. High-resolution reviews detailing the vertical course of the frontal branch and the arborization of the superficial temporal artery support lateral-to-medial tunneling with cannula planes kept sub-SMAS near the temporal line and suprapariosteal across the forehead, which aligns with single-entry trajectories [6].

Complication synthesis across facial regions recorded ecchymosis, swelling, pain, transient dimpling, and early asymmetry as the most frequent events, with infections, granulomas, thread migration, parotid injury, and nerve damage occurring infrequently; risk decreased when the number of skin entries was limited and when atraumatic tunneling and correct depth were maintained [10].

Ultrasound-assisted mapping supported safer single-entry execution. Periprocedural ultrasonography for thread procedures improved depth control, avoided glandular and vascular structures, and facilitated troubleshooting of misdirected threads; these findings favor a protocol that combines one puncture with pre-mapping and sonographic checks at anchor and inflection points [10,4].

Materials science and device patents converged on single-entry reliability. Modern braided barbed sutures with monofilament barbed inserts increase tissue purchase while maintaining glide, enabling firm fixation from one access

without external knots [1]. Contoured, multi-projection facelift threads improve bidirectional hold to sustain lift with fewer entry points [9,1]. Cannula designs tailored for thread deployment describe lumen geometries and beveled tips optimized for long, curved tunnels from a single puncture, reducing the need for secondary skin breaches [3]. Novel multi-axis barb architectures target uniform traction distribution along extended vectors, a prerequisite for single-entry temporal and eyebrow lifts [2].

Clinical technique articles focusing on the eyebrow reported that single-entry temporal access lowered rates of skin dimpling and track-related bruising compared with multipoint eyebrow punctures by minimizing dermal breaches and crossing angles; symmetry improved when vectors were planned from a common lateral anchor with contralateral mirroring [5,7,9].

Durability signals depended on thread design, anchoring quality, and vector span. Reviews noted longer apparent longevity when cog geometry, anchor engagement in the deep temporal fascia, and vector lengths exceeding 6–8 cm were combined—conditions met more consistently with single-entry lateral approaches than with short intra-brow passes [4,6].

Nerve-sparing pathways benefited from single-entry vectorization. By avoiding mid-forehead entries and concentrating work in the hairline, operators reduced interaction with supraorbital/supratrochlear neurovascular bundles and the sentinel vein, limiting neuropraxia and hematoma risk while preserving frontalis excursion [6,10].

The schematic delineates a lateral hair-bearing puncture, cannula passage over deep temporal fascia, and suprapariosteal forehead vectorization that avoids the frontal branch and superficial temporal artery (see Fig. 1) [9].

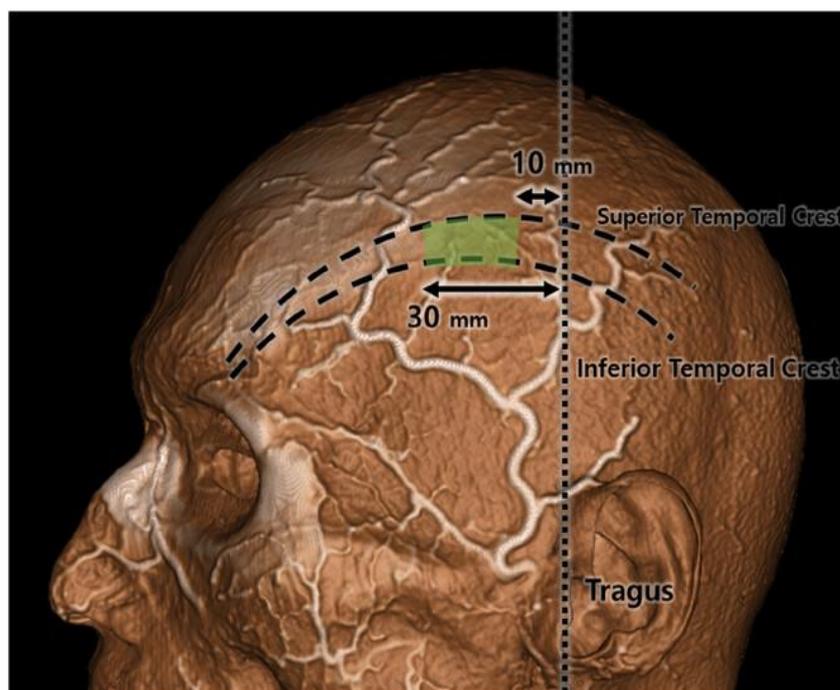


Figure 1: Safe temporal anchoring corridor for single-entry brow/temporal thread lift [9]

Across reports, reproducibility improved when operators adopted (i) one lateral puncture in the hairline; (ii) long, shallow vectors over galea to the lateral third of the brow; (iii) firm temporal anchoring without external knots; and (iv) ultrasound-assisted depth confirmation where available. The combined clinical and engineering record supports single-entry temporal thread lifting as a safety-forward standard for the upper third of the face.

4. Discussion

Single-puncture temporal entry consolidates vascular and neural avoidance strategy into one hair-bearing access while preserving lateral anchoring strength. Anatomical syntheses delineate a narrow “artery-sparing” lane superficial to deep temporal fascia and lateral to the sentinel vein and frontal branch of the facial nerve; the single lateral incision with sub-SMAS tunneling aligns with that lane and minimizes crossings with the superficial temporal artery compared with multi-entry eyebrow approaches [6, 9]. These trajectories mirror the scheme shown in Figure 1 from the temporal crest toward the lateral brow with supraperiosteal spread across the forehead, which reduces interaction with supraorbital and supratrochlear bundles [6, 9, 10].

Clinical reports focused on eyebrow repositioning converge on lower rates of track-related bruising and dermal dimpling when punctures are limited and vectors are planned from a lateral anchor with contralateral mirroring, rather than multiple intrabrow entries [5, 7]. Multidirectional absorbable threads achieve predictable tail elevation and arch reshaping when vectors converge at a temporal fixation point; multi-entry passes inside eyebrow skin increase crossing angles and tethering at the dermo-subdermal interface.

Durability signals depend on cog geometry, vector span, and anchor engagement. Review evidence attributes longer persistence to optimized barb shapes, adequate thread caliber, and sub-SMAS depth control; single-entry temporal anchoring supports longer continuous vectors (>6–8 cm) and more uniform load distribution than short intra-brow passes

[4, 6]. Suboptimal depth or short vectors shorten the effective lifting interval through early tissue slippage around barbs [4].

Complication synthesis across recent series lists ecchymosis, swelling, pain, and early dimpling as the dominant events; infection, granuloma, thread migration, parotid injury, and nerve damage occur less frequently and track with depth errors or vascular violation [10]. Concentrating access to a single lateral puncture reduces dermal breaches, simplifies hemostasis, and limits inadvertent passage near supraorbital/supratrochlear bundles in the mid-forehead [6, 10]. The evidence supports ultrasound-assisted mapping where available to confirm plane and avoid glandular or vascular structures, which pairs well with single-entry trajectories [4, 10].

Device and materials engineering underpin single-entry reliability. Braided constructs that embed barbed monofilament inserts increase purchase while maintaining glide, enabling firm temporal anchoring without external knots [1]. High-density, multi-projection barb architectures distribute traction more evenly along long vectors, an essential requirement for one-puncture lateral lifts [2]. Delivery is aided by cannula geometries tailored for long curved tunnels from a single puncture; ported cannula concepts allow atraumatic hydro-dissection or medicated irrigation along the same path, further decreasing the need for secondary skin breaches [3].

Evidence from forehead augmentation with volumizing threads confirms that long, controlled planes across the upper third of the face can be traversed safely and effectively when vector planning and anchoring are disciplined- conditions met by single-entry temporal access. Reports emphasize immediate contour changes with low acute morbidity under these parameters [8].

The synthesis in Table 1 contrasts safety-critical elements between single-entry temporal and multipoint eyebrow/forehead access using data abstractions from the cited five-year literature set.

Table 1: Comparative safety profile for upper-third thread lifting by access strategy (single-entry temporal vs multipoint eyebrow/forehead) [4-7, 9, 10]

Domain	Single-entry temporal access	Multipoint eyebrow/forehead access
Skin breaches	One hair-bearing puncture; reduced portal-related bruising/dimpling	Multiple intrabrow/forehead punctures; higher chance of dermal tethering at crossing angles
Vascular proximity	Lateral path over deep temporal fascia avoids STA trunk; reduced midline vessel encounters	Repeated traversals near supraorbital/supratrochlear bundles; higher chance of hematoma
Neural safety	Lateral tunneling planned to skirt frontal branch; predictable plane	Entry points near frontalis/glabella zones risk transient neuropraxia
Depth control	Sub-SMAS/supraperiosteal path along long vectors; ultrasound feasible at anchor/inflection	Variable plane switching across short passes; harder to standardize
Symmetry	Common lateral anchor with contralateral mirroring improves reproducibility	Discrete intrabrow entries increase asymmetry risk
Early adverse events	Lower observed track bruising/puckering when portals minimized	More dimpling/track ecchymosis reported in eyebrow punctures
Longevity determinants	Longer continuous vectors, optimized cogs, firm temporal fixation	Short vectors, mixed depths shorten persistence

Table 2 links patent-protected design choices to operative consequences that directly enable one-puncture execution.

Table 2: Patent-linked design features that operationalize single-puncture upper-third lifts [1-3, 9]

Patent / source	Feature set	Operative implication for one-puncture temporal/brow lift
US12016553B2 (Ethicon, 2024)	Braided suture with barbed monofilament inserts; concave core profiles	Higher tissue purchase with glide → stable lateral anchoring without external knots
WO2021222146A1 (Eurothreads, 2021)	Ten-dimensional barb array around central core	Uniform traction along long vectors → fewer entry points for equivalent lift
US20210338236A1 (Greene Technologies, 2021)	Thread-lift cannula with graded side ports for fluid delivery	Hydro-dissection/analgesic irrigation through same tunnel → reduced additional passes
Procedural guide (Yi et al., 2024)	Temporal anchoring over artery-sparing corridor, deep temporal fascia	Standardized lateral anchor and vectors → reproducible single-puncture execution

Client-relevant translational points map directly onto this framework. First, the temporal lift from a single puncture leverages long, shallow vectors and a fascia-based anchor consistent with [9]; the bench-to bedside novelty centers on consolidating access while preserving lift magnitude through barbed-geometry choices represented in [1] and [2]. Second, the single-point brow lift substitutes lateral anchoring for eyebrow-skin entries, addressing dimpling and bruising pathways highlighted in [5] and [7]. Third, ultrasound-assisted confirmation of plane and depth adds a protocol layer that fits single-entry execution without fragmenting access [4, 10].

Risk governance in routine practice should prioritize pre-mapping of the frontal branch course, sentinel vein, and STA divisions, documentation of vector lengths and angles, and per-side anchoring tests prior to final deployment. When the clinical goal includes both tail elevation and lateral rotation of the brow, converging vectors from a single lateral anchor reduce shear at the dermo-subdermal interface and help avoid pucker during frontalis excursion [5-7, 9]. Persistent dimpling, if encountered, responds to immediate massage or subcision; true malposition is best corrected early by reverse passage along the same tunnel before barbs fully engage [10].

Methodological limitations in the five-year corpus include small samples, heterogeneity in thread design, and limited head-to-head trials of access strategies. Even with those constraints, the directional agreement across anatomy-guided technique papers, complication reviews, and device disclosures supports single-puncture temporal access as the safer and more reproducible default for upper-third thread lifting when coupled with fascia anchoring, long vectors, and ultrasound-assisted depth control.

5. Conclusion

The synthesis supports a single hair-bearing temporal puncture with sub-SMAS vectorization toward the lateral third of the brow as a reproducible standard for upper-third thread lifting. Anatomical planning over deep temporal fascia reduces interactions with the superficial temporal artery and the frontal branch, while supraperiosteal forehead spread limits midline neurovascular contact. Comparative signals favor single-entry trajectories for lower rates of track bruising and dermal dimpling, improved symmetry via contralateral mirroring from a common lateral anchor, and longer apparent persistence where vectors exceed 6–8 cm and anchors engage fascia. Device disclosures on braided barbed sutures and multi-axis barb arrays, paired with cannula designs for long curved tunnels, offer an engineering rationale for knot-free fixation from one access. A practical protocol follows: pre-

mapping of vessels and nerves, ultrasound confirmation of depth at anchor and inflection points, standardized vector documentation, and immediate management of dimpling or malposition through massage or reverse passage before full barb engagement. These steps fulfill the stated aim and the three tasks by consolidating anatomy, safety, and patent-enabled tooling into a unified, clinic-ready standard.

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